

CLAIMS

We claim:

1. Safety switching module for safely switching-off an electrical load, comprising:

a first and a second switching control device;

a first and a second switching element both being series-connected with each other and forming a first current path for supplying the load, whereby the first switching element can be controlled by the first switching control device and the second switching element can be controlled by the second switching control device; and

an evaluation and control device for testing the switching-off ability of at least one switching element,

characterized in that

a third and a fourth switching element are provided which are connected to each other in series, are connected in parallel to the series connection consisting of said first and second switching elements and form a second current path, the third switching element being controlled by the first switching control device and the fourth switching element being controlled by the second switching control device; and

said evaluation and control device carries out the test of the switching elements alternating in one of both current paths so that the other of both current paths supplies the load.

2. The safety switching module of claim 1, characterized in that said first and said third switching element are provided as semiconductor switching elements.

3. The safety switching module of claim 1, characterized in that said second and said fourth switching element are provided as electromechanical switching elements.
4. The safety switching module of claim 2, characterized in that said second and said fourth switching element are provided as electromechanical switching elements.
5. The safety switching module of claim 1, characterized in that said switching control devices are provided as a dual-channel switching control device.
6. The safety switching module of claim 1, characterized in that said current paths are coupled with a supply voltage on one side and with the load on the other side.
7. The safety switching module of claim 1, characterized in that the evaluation and control device is coupled with each of both current paths between said first and second switching elements and said third and fourth switching elements, respectively.
8. The safety switching module of claim 1, characterized in that said evaluation and control device generates a short switching-off pulse and supplies the pulse either said first and second switching elements or said third and fourth switching elements in order to switch them off shortly.
9. The safety switching module of claim 7, characterized in that said switching-off pulse is modulated on said signal of the switching control device.
10. The safety switching module of claim 1, characterized in that said switching elements are provided as electromechanical switching elements.

11. The safety switching module of claim 1, characterized in that said switching elements are provided as semiconductor switching elements.
12. The safety switching module of claim 3, wherein said electromechanical switching elements are provided as relays.
13. The safety switching module of claim 4, wherein said electromechanical switching elements are provided as relays.
14. The safety switching module of claim 10, wherein said electromechanical switching elements are provided as relays.
15. Method for testing the switching-off ability of a switching element in a safety switching module which serves to safely switch-off an electric load, comprising the steps:
 - providing a first current path for energizing the load, said first current path comprising at least one switching element for safely switching-off;
 - providing a second current path in parallel to the first current path, for energizing the load, the second current path comprising at least one switching element;
 - alternately testing the switching-off ability of one of both current paths, the other current path not being tested solely energizing said load during this test phase.

16. Method for testing the switching-off ability of a switching element in a safety switching module which serves to safely switch-off an electric load, comprising the steps:

- providing a first current path for energizing the load, said first current path comprising a first and a second switching element for safely switching-off, both switching elements being connected in series;
- providing a second current path in parallel to the first current path, for energizing the load, the second current path comprising a third and a fourth switching element, both switching elements being connected in series;
- Driving the first and third switching elements by a first switching control device;
- Driving the second and fourth switching elements by a second switching control device; and
- alternately testing the switching-off ability of one of both current paths, the other current path not being tested solely energizing said load during this test phase.